

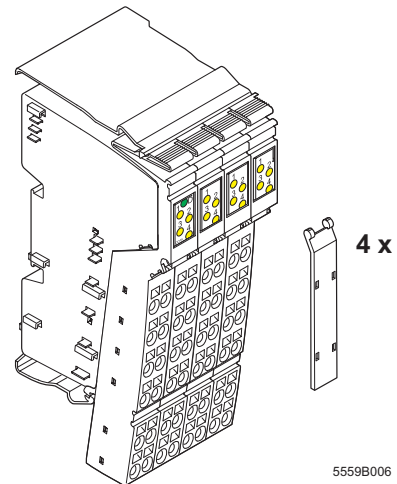
IB IL 24 DO 16 ...

Inline Terminal With 16 Digital Outputs

AUTOMATIONWORX

Data Sheet
5559_en_04

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Description

The terminal is designed for use within an Inline station.
It is used to output digital signals.

Features

- Connections for 16 digital actuators
- Connection of actuators in 2 and 3-wire technology
- Nominal current per output: 0.5 A
- Total current of the terminal: 8 A
- Short-circuit and overload protected outputs
- Diagnostic and status indicators



This data sheet is only valid in association with the IB IL SYS PRO UM E user manual or the Inline system manual for your bus system.



Please note that the numbering of the terminal points differs with regard to the different connector versions (see Figure 2 on page 6).



Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.
A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.



This data sheet is valid for all products listed on the following page:

Ordering Data

Products

Description	Type	Order No.	Pcs./Pck.
Inline Terminal with 16 digital outputs; without accessories transmission speed of 500 kbps	IB IL 24 DO 16	2726272	1
Inline Terminal with 16 digital outputs; complete with accessories (connectors and labeling fields); transmission speed of 500 kbps	IB IL 24 DO 16-PAC	2861292	1
Inline Terminal with 16 digital outputs; complete with accessories (connectors with individual numbering and labeling fields); transmission speed of 500 kbps	IB IL 24 DO 16-PAC/SN	2862961	1
Inline Terminal with 16 digital outputs; without accessories transmission speed of 2 Mbps	IB IL 24 DO 16-2MBD	2855318	1
Inline Terminal with 16 digital outputs; complete with accessories (connectors and labeling fields); transmission speed of 2 Mbps	IB IL 24 DO 16-2MBD-PAC	2862013	1
Inline Terminal with 16 digital outputs; complete with accessories (connectors with individual numbering and labeling fields); transmission speed of 2 Mbps	IB IL 24 DO 16-2MBD-PAC/SN	2878324	1



Four of the listed connectors or one connector set are needed for complete fitting of the IB IL 24 DO 16 and the IB IL 24 DO 16-2MBD terminals.

Accessories

Description	Type	Order No.	Pcs./Pkt
Connector, without colored identification, for digital 4 or 16-channel Inline terminals	IB IL SCN-12	2726340	10
Connector, colored identification, for digital 4, or 16-channel Inline terminals	IB IL SCN-12-OCP	2727624	10
Connector set with 48 spring-cage connections (green, w/o color print)	IB IL DI/DO 16-PLSET	2860976	1
Connector set with 48 spring-cage connections (green, with color print)	IB IL DO 16-PLSET/OCP	2860992	1

Documentation

Description	Type	Order No.	Pcs./Pck.
"Automation Terminals of the Inline Product Range" user manual	IL SYS INST UM E	2698737	1
"Configuring and Installing the INTERBUS Inline Product Range" user manual	IB IL SYS PRO UM E	2743048	1

Technical Data

General Data	
Housing dimensions (width x height x depth)	48.8 mm x 120 mm x 71.5 mm
Weight	130 g (without connector), 152 g (with connector)
Operating mode	Process data mode with 1 word
Connection method for actuators	2 and 3-wire technology
Ambient temperature (operation)	-25°C to +55°C
Ambient temperature (storage/transport)	-25°C to +85°C
Permissible humidity (operation/storage/transport)	10% to 95%, according to DIN EN 61131-2
Permissible air pressure (operation/storage/transport)	70 kPa to 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Protection class	Class according to VDE 0106, IEC 60539

General Data (Continued)

Connection data for Inline connector

Connection method	Spring-cage terminals
Conductor cross section	0.2 mm ² to 1.5 mm ² (solid or stranded), 24 - 16 AWG

Interface

Local bus	Through data routing
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Transmission Speed

IB IL 24 DO 16; IB IL 24 DO 16-PAC; IB IL 24 DO 16-PAC/SN 500 kbps

IB IL 24 DO 16-2MBD; IB IL 24 DO 16-2MBD-PAC;
IB IL 24 DO 16-2MBD-PAC/SN 2 Mbps**Power Consumption**

	500 kbps	2 Mbps
Communications power	7.5 V DC	7.5 V DC
Current consumption at U_L	90 mA, maximum	105 mA, maximum
Power consumption at U_L	0.675 W, maximum	0.79 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)	24 V DC (nominal value)
Nominal current consumption at U_S	8 A (16 x 0.5 A), maximum	8 A (16 x 0.5 A), maximum

Supply of the Module Electronics and I/O Through Bus Coupler/Power Terminal

Connection method	Through potential routing
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Digital Outputs

Number	16
Nominal output voltage U_{OUT}	24 V DC
Differential voltage for I_{nom}	≤ 1 V
Nominal current I_{nom} per channel	0.5 A
Tolerance of the nominal current	+10%
Total current	8 A
Protection	Short circuit; overload



Channels are thermally coupled in groups of four, i.e., an error in one channel can affect the other channels.

Nominal load

Ohmic	48 Ω /12 W
Lamp	12 W
Inductive	12 VA (1.2 H, 50 Ω)

Signal delay upon power up of:

Nominal ohmic load	500 μ s, typical
Nominal lamp load	100 ms, typical (with switching frequencies up to 8 Hz; above this frequency the lamp load responds like an ohmic load)
Nominal inductive load	100 ms (1.2 H, 50 Ω), typical

Signal delay upon power down of:

Nominal ohmic load	1 ms, typical
Nominal lamp load	1 ms, typical
Nominal inductive load	50 ms (1.2 H, 50 Ω), typical

Switching frequency with:

Nominal ohmic load	300 Hz, maximum
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This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software, and the control or computer system used.

Nominal lamp load	8 Hz, maximum
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Digital Outputs (Continued)



This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software, and the control or computer system used.

Nominal inductive load	0.5 Hz (1.2 H, 50 Ω), maximum
Overload response	Auto restart
Response time with ohmic overload (12 Ω)	3 s, approximately
Restart frequency with ohmic overload	400 Hz, approximately
Restart frequency with lamp overload	400 Hz, approximately
Response with inductive overload	Output may be damaged
Response time in the event of a short circuit	3 s, approximately
Reverse voltage protection against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	Protected against reverse voltages, permissible current 2 A, maximum
Validity of output data after connecting the 24 V supply voltage (power up)	5 ms, typical
Response upon power down	The output follows the supply voltage without delay.
Limitation of the voltage induced on circuit interruption	-15 V ≤ U _{demag} ≤ -45.8 V (U _{demag} = demagnetization voltage)
Single maximum energy in free running	400 mJ, maximum
Protective circuit type	Integrated 45 V Zener diode in the output chip
Overcurrent circuit	0.7 A, minimum
Output current when switched off	300 μA, maximum
Output voltage when switched off	2 V, maximum
Output current with ground connection interrupt	25 mA, maximum
Switching power with ground connection interrupt	100 mW at 1 kΩ load resistance, typical
Inrush current with lamp load	1.5 A for 20 ms, maximum

Output Characteristic Curve When Switched On (Typical) (500 kbps and 2 Mbps)

Output Current (A)	Output Voltage Difference (V)
0	0
0.1	0.04
0.2	0.08
0.3	0.12
0.4	0.16
0.5	0.20

Power Dissipation

500 kbps

2 Mbps

Formula to Calculate the Power Dissipation of the Electronics

$$P_{TOT} = 0.19 \text{ W} + \sum_{i=1}^n (0.10 \text{ W} + I_{Li}^2 \times 0.4 \Omega)$$

$$P_{TOT} = 0.40 \text{ W} + \sum_{i=1}^n (0.10 \text{ W} + I_{Li}^2 \times 0.4 \Omega)$$

Where

P_{TOT} Total power dissipation in the terminal

i index

n Number of set outputs (n = 1 to 16)

I_{Li} Load current of output i

Power Dissipation of the Housing P_{HOu} (500 kbps and 2 Mbps)

2.7 W, maximum (within the permissible operating temperature)

Limitation of Simultaneity, Derating (500 kbps and 2 Mbps)

Ambient Temperature T_A	Maximum Load Current at 100% Simultaneity	Maximum Load Current at 75% Simultaneity
$-25^{\circ}\text{C} \leq T_A < +40^{\circ}\text{C}$	0.50	0.50
$+40^{\circ}\text{C} \leq T_A < +45^{\circ}\text{C}$	0.45	0.50
$+45^{\circ}\text{C} \leq T_A < +50^{\circ}\text{C}$	0.40	0.50
$+50^{\circ}\text{C} \leq T_A < +55^{\circ}\text{C}$	0.35	0.50

Safety Equipment

Overload/short circuit in the segment circuit	Electronic; with four 4-channel drivers
Surge voltage	Protective elements of the power terminal Protection up to 33 V DC
Polarity reversal of the supply voltage	Protective elements of the power terminal The supply voltage must be protected. The power supply unit should be able to supply four times (400%) the nominal current of the fuse.
Reverse voltage	Integrated protection against reverse voltages

Electrical Isolation/Isolation of the Voltage Areas

To provide electrical isolation between the logic level and the I/O area it is necessary to supply the station bus coupler and the digital output terminal described here via the bus coupler or a power terminal from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted. (See also application description.)

Common Potentials

The 24 V main voltage, 24 V segment voltage, and GND have the same potential. FE is a separate potential area.

Separate Potentials in the System Consisting of Bus Coupler/Power Terminal and I/O Terminal**- Test Distance**

5 V supply incoming remote bus/7.5 V supply (bus logic)
5 V supply outgoing remote bus/7.5 V supply (bus logic)
7.5 V supply (bus logic)/24 V supply (I/O)
24 V supply (I/O)/functional earth ground

- Test Voltage

500 V AC, 50 Hz, 1 min.
500 V AC, 50 Hz, 1 min.
500 V AC, 50 Hz, 1 min.
500 V AC, 50 Hz, 1 min.

Error Messages to the Higher-Level Control or Computer System

Short circuit/overload of an output	Yes
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An error message is generated when an output is short circuited and switched on. In addition, the diagnostic LED (D) flashes on the terminal at 2 Hz (medium) under these conditions.

Falling below or exceeding the operating voltage	No
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Approvals

For the latest approvals, please visit www.download.phoenixcontact.com.

Local Diagnostic and Status Indicators and Terminal Point Assignment

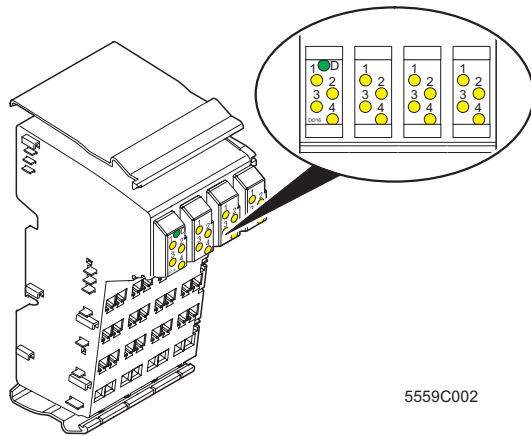


Figure 1 Diagnostic and status indicators

Local Diagnostic and Status Indicators

Des.	Color	Meaning
D	Green	Diagnostics
1, 2, 3, 4	Yellow	Status indicators of the outputs

Function Identification

Pink

2 Mbps: White stripe in the vicinity of the D LED

Terminal Point Assignment for Each Connector

Terminal Point	Assignment
x.1	Signal output (OUT)
x.2	Ground contact (GND) for 2 and 3-wire termination
x.3	FE connection for 3-wire termination
x.4	Signal output (OUT)
x.5	Ground contact (GND) for 2 and 3-wire termination
x.6	FE connection for 3-wire termination

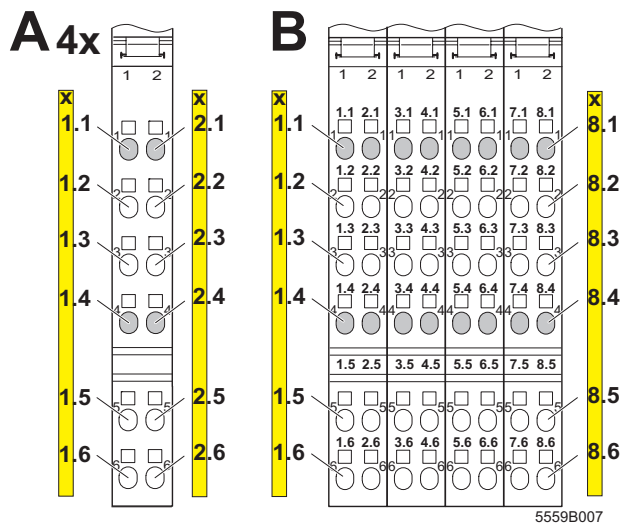
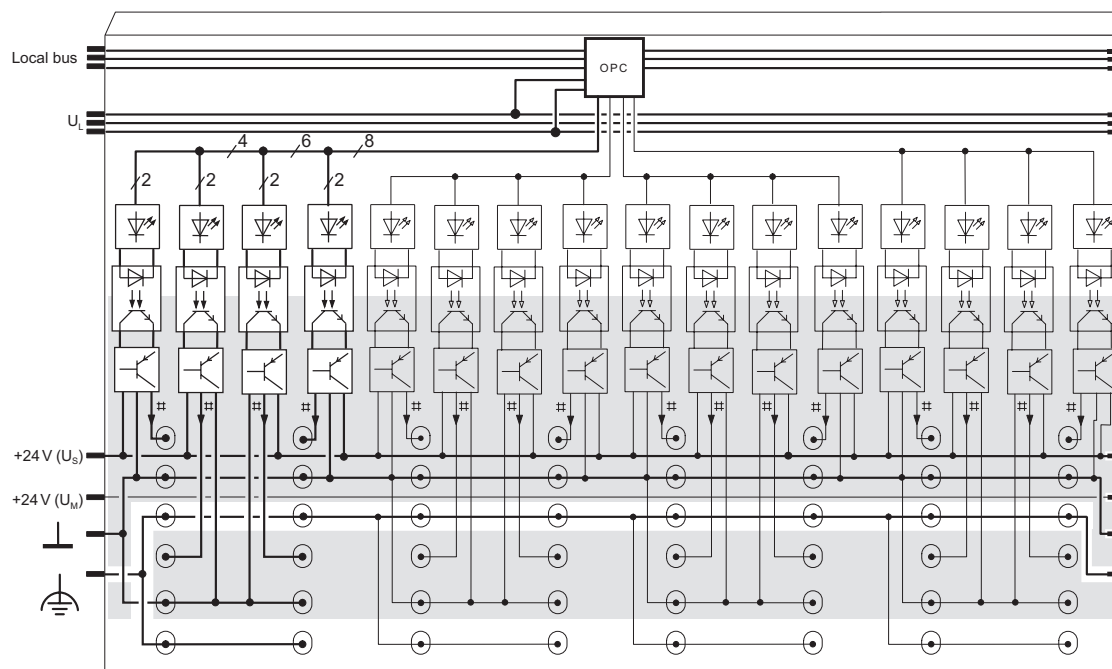


Figure 2 Terminal point numbering when using individual connectors (A) and when using a connector set (B)

- A** Using the IB IL 24 DO 16-PAC/SN and IB IL 24 DO 16-2MBD-PAC/SN with the provided connectors
Using individual connectors (IB IL SCN-12 or IB IL SCN-12-OCP)
- B** Using the IB IL 24 DO 16-PAC and IB IL 24 DO 16-2MBD-PAC with the original connector set
Using the IB IL DO 16-PLSET/OCP or IB IL DI/DO 16-PLSET connector sets

Internal Circuit Diagram



5559B003

Figure 3 Internal wiring of the terminal points

Key:



Protocol chip (bus logic
including voltage conditioning)



LED



Optocoupler



Transistor



Digital output



Electrically isolated area



Other symbols used are explained in the
IB IL SYS PRO UM E user manual or the
system manual for your bus system.

Connection Example



When connecting the actuators observe the assignment of the terminal points to the process data (see page 9).

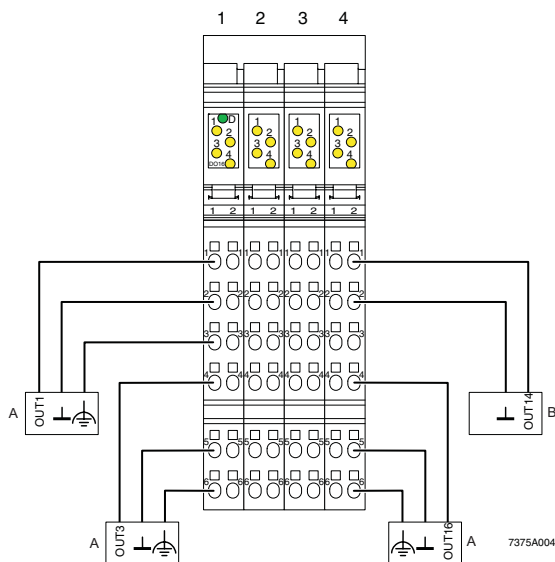


Figure 4 Typical actuator connection

A: 3-wire termination

B: 2-wire termination

The numbers above the module illustration indicate the connector slots.

Programming Data/Configuration Data

Local Bus (INTERBUS)

ID code	BD _{hex} (189 _{dec})
Length code	01 _{hex}
Process data channel	16 bits
Input address area	0 bytes
Output address area	2 bytes
Parameter channel (PCP)	0 bytes
Register length (bus)	2 bytes

Other Bus Systems



For the programming data/configuration data of other bus systems, please refer to the corresponding electronic device data sheet (e.g., GSD, EDS).

Process Data

Assignment of the Terminal Points to the OUT Process Data



Please refer to the data sheet DB GB IBS SYS ADDRESS, Order No. 9000990, for the assignment of the shown (byte.bit) view to your INTERBUS control or computer system.

For the assignment of the illustrated (byte.bit) view to control systems of other bus systems, please refer to the AH IB IL 24 DI/DO 16 ADDRESS document, Order No. 9014124.



The following table applies to the IB IL 24 DO 16-PAC and the IB IL 24 DO 16-2MBD-PAC terminals with the original connector set and when using the IB IL DI/DO 16-PLSET and IB IL DO 16-PLSET/OCP connector sets (see also Figure 2 on page 6, detail B).

(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assignment	Slot	2				1				4				3			
	Terminal point (signal)	4.4	3.4	4.1	3.1	2.4	1.4	2.1	1.1	8.4	7.4	8.1	7.1	6.4	5.4	6.1	5.1
	Terminal point (GND)	4.5	3.5	4.2	3.2	2.5	1.5	2.2	1.2	8.5	7.5	8.2	7.2	6.5	5.5	6.2	5.2
	Terminal point (FE)	4.6	3.6	4.3	3.3	2.6	1.6	2.3	1.3	8.6	7.6	8.3	7.3	6.6	5.6	6.3	5.3
Status indicator	Slot	2				1				4				3			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1



The following table applies to the IB IL 24 DO 16-PAC/SN terminal with the original connector set and when using the IB IL SCN-12 or IB IL SCN-12-OCP connectors (see also Figure 2 on page 6, detail A).

(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assignment	Slot	4				3				2				1			
	Terminal point (signal)	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1
	Terminal point (GND)	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2
	Terminal point (FE)	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3
Status indicator	Slot	4				3				2				1			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1